

No. 647,766.

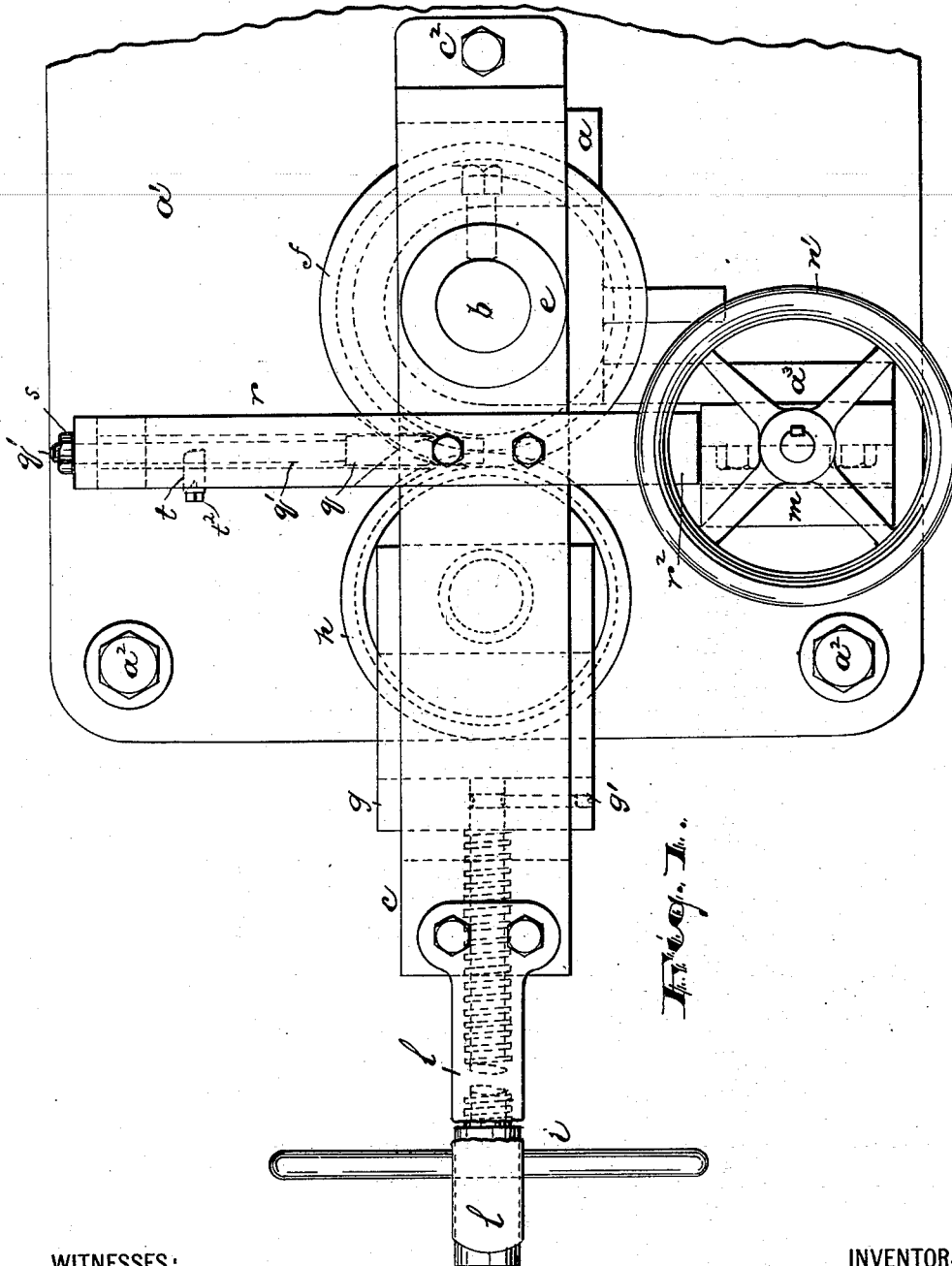
Patented Apr. 17, 1900.

P. H. SEERY.
TUBE BENDING MACHINE.

(Application filed June 3, 1899.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

Alfred R. Krause.

Russell M. Everett.

INVENTOR:

Peter H. Seery,

BY

Draper C. Seery,
ATTORNEYS.

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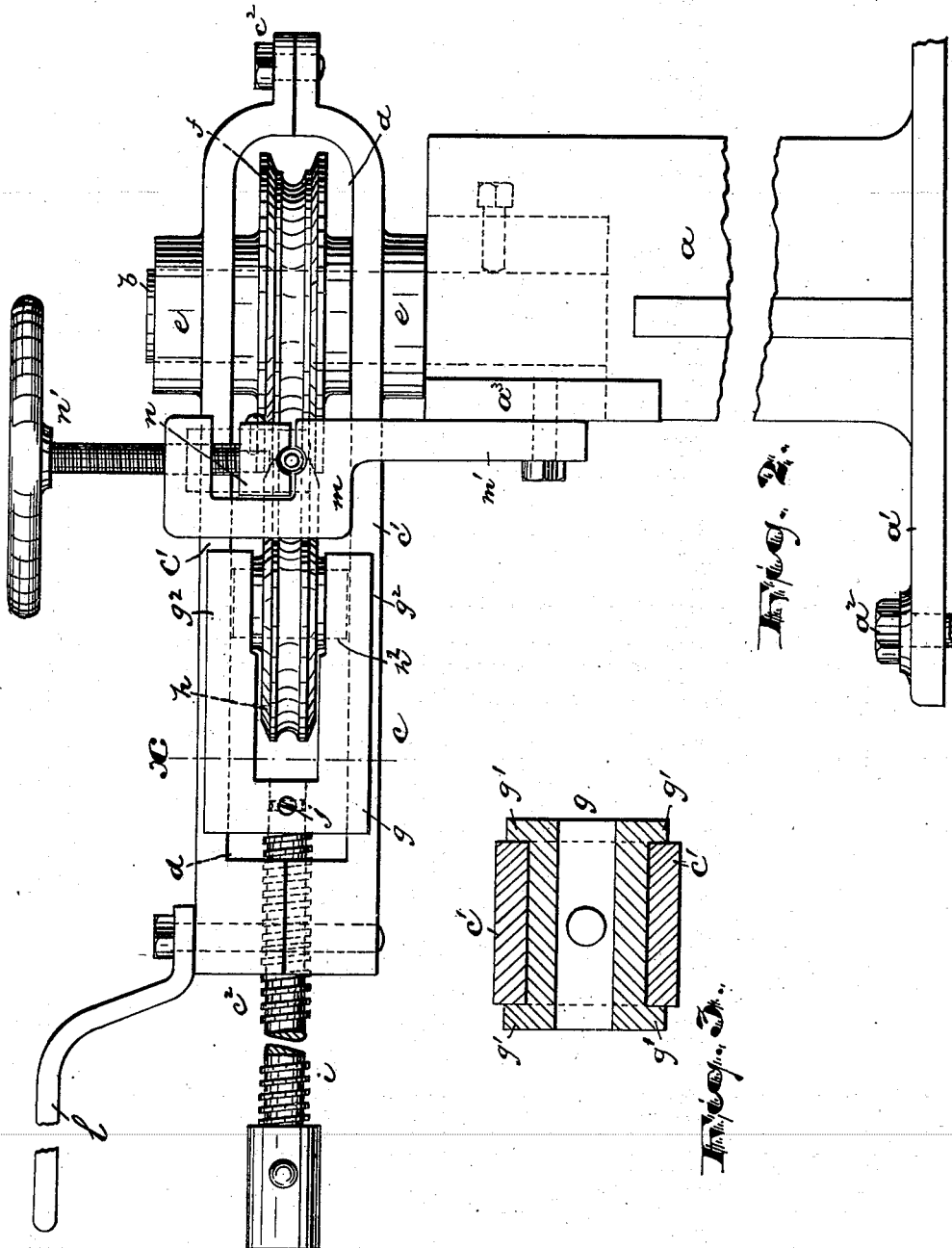
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Peter H. Seery,

BY

Drake & Co.

ATTORNEYS.

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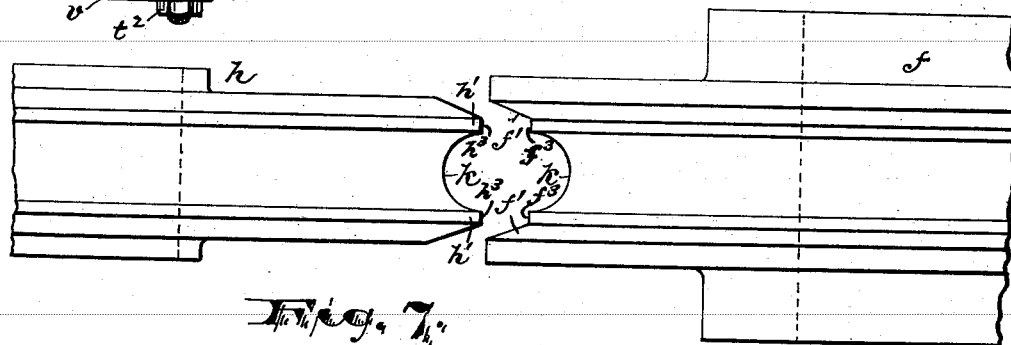
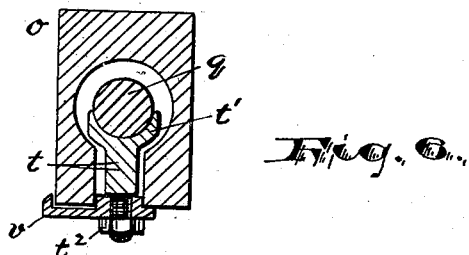
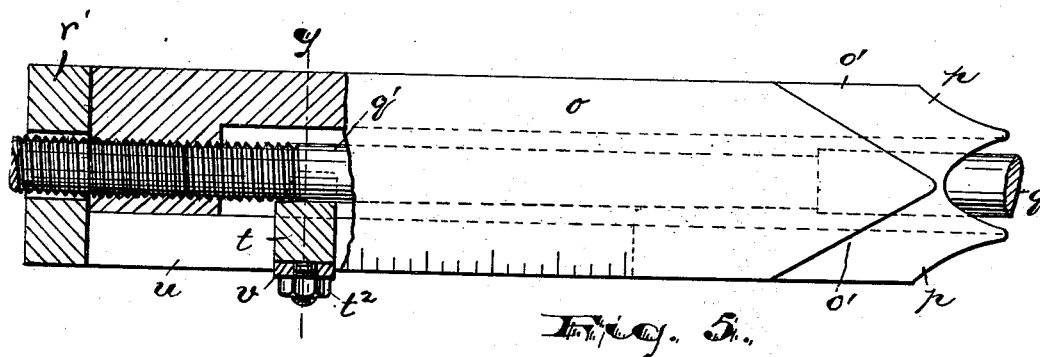
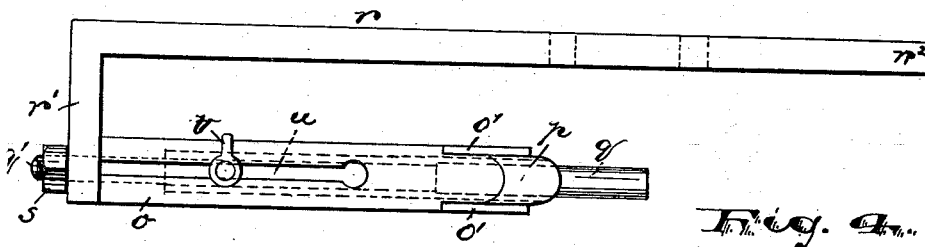
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Drake & Co.
ATTORNEYS

UNITED STATES PATENT OFFICE.

PETER H. SEERY, OF NEWARK, NEW JERSEY.

TUBE-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 647,766, dated April 17, 1900.

Application filed June 3, 1899. Serial No. 719,193. (No model.)

To all whom it may concern:

Be it known that I, PETER H. SEERY, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Tube-Bending Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The objects of this invention are to enable metal tubing to be bent without filling the bore of the tube with sand, lead, or the like, to thus facilitate and lessen the expense of the bending, to obtain a more perfect bend, and to secure other advantages and results, some of which may be hereinafter referred to in connection with the description of the working parts.

The invention consists in the improved metal-tube-bending machine and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several views, Figure 1 is a plan of my improved bending-machine. Fig. 2 is a side elevation of the same. Fig. 3 is a sectional view of a certain adjustable sliding frame, taken on line *x*, Fig. 2. Fig. 4 is a side view of certain cooperating dies and the brackets supporting the same. Fig. 5 is a plan view of said dies, on an enlarged scale and partly in central horizontal section. Fig. 6 is a transverse sectional view taken at line *y*, Fig. 5; and Fig. 7 shows the cooperating peripheries of certain bending-rolls.

In said drawings, *a* indicates a suitable standard or upright post provided with a broad base or foot *a'*, adapted to be secured to the floor by screws *a²* or the like, a solid support being thus provided for the operating parts to be described. The top of said post *a* provides a socket and set-screw for a vertical arbor or pivotal pin *b*, which pin serves

as a fulcrum for a lever *c*. Said lever *c* is made in upper and lower halves *c' c'*, bolted together at the ends, as at *c²*, and between said ends having their adjacent faces recessed to provide an open middle space *d* in side view, which extends nearly the whole length of the lever. Near one end of the lever said sections *c' c'* are outwardly provided with integral bosses *e*, and the lever is perforated from top to bottom centrally through said bosses to receive the fulcrum-pin *b*. A bending-roll *f* is also pivoted upon the pin *b*, said roll lying in the middle space *d* of the lever between the upper and lower halves, but independent thereof.

At the outer end of the lever *c* farthest from its fulcrumal point the middle open space *d* provides a slideway for an adjustable frame *g*, said frame extending laterally beyond the sides of the upper and lower halves *c'* of the lever and having top and bottom vertical flanges *g'* engaging said sides of the lever to prevent lateral displacement of the frame *g*. Said frame is clasp-shaped or U-shaped in side view, with its open end toward the fulcrumed end of the lever, and between the upper and lower arms *g²* is pivoted upon a pin *h²* a second bending-roll *h*, lying in the same horizontal plane as and adapted to cooperate with the first-described roll *f*.

The outer end of the lever *c* is centrally and longitudinally perforated and threaded to receive a handled screw *i*, which at its inner end projects into the space *d* of the lever. The inner extremity of the screw *i* is devoid of threads and lies in a perforation in the end of the sliding frame *g*, the end of a pin *j* on the frame projecting into an annular groove *j'* in said extremity. Any other means of connecting the adjusting-screw *i* to the frame may be used, so that said frame can be moved longitudinally of the lever *c* by means of the adjusting-screw *i* to bring the movable roll *h* into any desired relation to the stationary roll *f*. The peripheries of the rolls *f h* are of any usual construction, with interlocking flanges *f' h'* and central semicircular grooves *kk* to inclose the tube. A handled extension *l* is also preferably fixed to the outer end of the lever *c* to give the desired leverage.

A clamp *m* is attached by an arm *m'* to a suitable portion or extension *a³* of the stand-

ard' or post *a* and is provided with a vertically-movable jaw *n*, operated by a screw *n'*, said clamp being in the same horizontal plane with the rolls *f h* and adapted to firmly hold a tube when in position between said rolls, as is common. Bending is accomplished by turning the lever *c* upon its fulcrumal pin *b* through an arc of such length as is necessary, as will be understood by one skilled in the art.

To prevent crimping or flattening of the tube as it is bent, I have provided the dies and related parts, which are shown in detail in Figs. 4, 5, and 6 and which I will now describe. A female die *o*, of considerable length and having a cylindrical bore into which the tube to be bent will nicely fit, is disposed in the plane of the rolls *f h* at right angles to a line joining the centers of said rolls and on the opposite side of the lever *c* from the clamp *m*. The end of said female die extends in between the rolls *f h* as far as possible and is for this purpose somewhat pointed in plan view, with opposite rearwardly-beveled sides *o' o'*, adapted to engage the shoulders *f^s h^s* on the rolls. Each of said walls or sides *o' o'* is further provided with a forwardly-projecting shoulder or extension *p*, having its face rounded in edge view and concaved in plan view, whereby said shoulder *p* fits into the groove *k* of the adjacent roll. Within said female die *o* is a longitudinally-disposed male die or triplet comprising a body part *q* of such diameter as to fit within the tube to be bent and a shank *q'*, extending back from said body part. The body part *q* of said triplet lies at the forward end of the female die *o*, projecting out therefrom to the line joining the center of the rolls *f h*. The shank *q'* is at its rear end threaded and screws through a correspondingly-threaded perforation in the closed rear end of the female die, thus enabling said triplet to be nicely adjusted in longitudinal relation to the female die. The rear end of the triplet projects beyond the die *o* and is adapted to pass through an opening in the downwardly-extending arm *r'* of a bracket *r* and receive a nut *s*, by which the dies are firmly secured to said bracket. The main part of the bracket *r* extends parallel to the dies and is adapted to lie across the top of the lever *c* and be screwed thereto, the dies extending through the open space *d* of the lever. The end *r²* of said bracket *r* opposite to the arm *r'* projects beyond the lever *c* to serve as a stop and engage the face of the fixed clamp *m* to insure the lever *c* being brought to a standstill with the dies *o q* directly in line with the jaws of said clamp. With the parts in this position the end of the tube to be bent is pushed through the clamp *m* between the rolls *f h* and into the female die *o* on the other side, the triplet passing inside of the tube. The clamp *m* is then tightened upon the tube. The adjustable roll *h* is slid up against the tube, the lever *c* swung upon its pivot, and a perfect bend secured without crimping or flattening.

To limit the distance into the dies which the tube may be pushed, and to thus enable a bend to be produced at any given distance from the end of the tube, I have provided a sliding stop *t* on the female die, as shown more particularly in Figs. 5 and 6. Said stop slides longitudinally in a slot *u* in the female die *o* and has at the inner end projecting wings *t'*, which lie in the annular space between the male and female dies. The outer end is threaded to receive a nut *t²* for setting the stop at any desired point, and the outer end may also carry a pointer *v*, which shows on a graduated scale at the side of the female die the distance at which the bend will be made from the end of the tube with the stop at that point.

It will be understood that various changes and modifications may be made from the exact construction described without departing from the spirit or scope of the invention, and I do not wish to be understood as limiting myself by the positive descriptive terms employed except as the state of the art may require.

Having thus described the invention, what I claim as new is—

1. In a tube-bending machine, a standard or post providing a pivoted pin, a looped lever fulcrumed near one end upon said pin, a roll pivotally turning upon said pin and lying within the lever, an adjustable frame sliding in said looped lever without connection to the lever and a roll pivoted in said frame and adapted to cooperate with the first roll, substantially as set forth.

2. A tube-bending machine, comprising a lever consisting of upper and lower sections oppositely bent or concaved and providing an opening or slideway between, said lever being pivoted near one end, a bending-roll pivoted upon the same pin with said lever and lying in the opening thereof, a frame sliding longitudinally in said slideway of the lever and being free from connection to the sections of the lever, said frame having side flanges lying outside the slideway and preventing lateral displacement, a second bending-roll pivoted in said frame and means for sliding said frame, substantially as set forth.

3. In a tube-bending machine, the combination of a lever comprising upper and lower sections oppositely concaved or bent apart for the middle portion of their length and separably connected at the ends, said lever being perforated near one end to receive a pivotal pin, a bending-roll adapted to lie between the upper and lower sections of said lever upon the said fulcrumal pin, a sliding frame lying between the sections and having flanges at the sides to prevent displacement, said frame having upper and lower arms projecting toward the fulcrumal point of the lever, a second bending-roll pivoted between said arms and an adjusting-screw for moving the frame longitudinally, substantially as set forth.

4. A tube-bending machine, comprising an

oscillating lever, cooperating rolls pivoted on said lever, a fixed clamp at one side of said lever adapted to hold the tube, and a movable mandrel at the opposite side of the lever adapted to enter the tube, substantially as set forth.

5 5. In a tube-bending machine, a lever carrying cooperating bending-rolls between which the tube extends, and a mandrel supported upon said lever and lying in the line of tangency of said rolls, substantially as set forth.

15 6. In a tube-bending machine, a lever carrying cooperating bending-rolls between which the tube extends, a stationary clamp at one side of the lever for holding the tube, and a mandrel and die at the opposite side of the lever and movable with said lever, substantially as set forth.

20 7. In a tube-bending machine, an oscillating lever carrying cooperating rolls between which the tube extends, a mandrel supported upon said lever and projecting therefrom at right angles at the point of opening between said rolls, said mandrel being in front of the lever as it is oscillated, substantially as set forth.

30 8. In a tube-bending machine, an oscillating lever, cooperating bending-rolls pivoted in said lever, a fixed clamp adapted to hold the tube with its end extending between the rolls at right angles to the line joining the centers of said rolls, and a mandrel and inclosing die carried by the lever and receiving the end of the tube which projects beyond the lever on the opposite side from the fixed clamp, substantially as set forth.

35 9. In a tube-bending machine, a lever carrying bending-rolls, a fixed clamp, a rigid bar fixed transversely to the lever and at one end engaging said clamp to stop the lever in a position at right angles to said clamp, and at the other end supporting a mandrel and die, substantially as set forth.

45 10. In a tube-bending machine, a mandrel fitting the interior of the tube and a female die inclosing the tube and mandrel, said mandrel and die being carried just ahead of the point of bending, substantially as set forth.

50 11. In a tube-bending machine, a rigid mandrel fitting inside of the tube, and a female die inclosing the tube, said mandrel and die holding that portion of the tube which is to be bent and always extending to the point of bending, substantially as set forth.

55 12. In a tube-bending machine, an oscillating lever carrying cooperating rolls around one of which the tube is adapted to be bent, and a cooperating mandrel and die carried by the lever and holding that part of the tube which is about to be bent against distortion, substantially as set forth.

13. In a tube-bending machine, a cooperating die and mandrel holding the end of the

65 tube which is about to be bent, said die comprising a block having a bore adapted to receive the tube and said mandrel being centrally disposed in said die and adapted to enter the tube, and said die and mandrel being carried along said end of the tube just in advance of the point at which bending is taking place, substantially as set forth.

70 14. In a tube-bending machine, a cooperating die and mandrel for holding the part of the tube to be bent, said die having a bore receiving the tube and said mandrel being centrally disposed in said die and having its end threaded to screw in cooperating threads at the end of the female die, whereby relative adjustment of the parts may be made, substantially as set forth.

80 15. In a tube-bending machine, the combination with cooperating bending-rolls having grooved peripheries, of a die into which the end of the tube to be bent extends and a mandrel longitudinally and centrally disposed in said die and fitting the interior bore of the tube, said die having its end lying closely adjacent to the meeting peripheries of the rolls and said mandrel extending to the line joining the centers of said rolls, said die and mandrel being carried ahead of the bending-rolls and exposing the tube to their action as they move forward, substantially as set forth.

95 16. In a tube-bending machine, the herein-described cooperating die and mandrel for holding the end of the tube to be bent, said die being slotted at one side, and a stop having a foot lying in the chamber to engage the tube and a shank lying in said slot, and a nut at the outer end of the shank for setting said stop in any desired position, substantially as set forth.

105 17. In a tube-bending machine, the herein-described die and mandrel for preserving the shape of the tube adjacent to the point of bending, said die being longitudinally slotted at one side, a stop for the end of the tube movable in said slot, means for fixing said stop in position and a pointer carried by said stop and cooperating with a scale on the die, substantially as set forth.

115 18. In a bending-machine, the combination with a lever carrying a bending-roll around a cooperating roll, of means for holding that portion about to be bent against distortion, said means being carried upon the lever just in advance of the point of bending, substantially as set forth.

120 In testimony that I claim the foregoing I have hereunto set my hand this 1st day of June, 1899.

PETER H. SEERY.

Witnesses:

C. B. PITNEY,
RUSSELL M. EVERETT.